

Patent claims

*Revised on 15th March 2004 upon Written Opinion according
to rule 66 PCT of 18th February 2004*

1. A thermoactive wall and ceiling element for installation in rooms of newly built and old buildings, including lightweight construction buildings, for their heating and cooling, in that it includes a closed casing (2) which for intermediately storing heat contains a phase change material (3) as a latent heat reservoir, as well as at least one associated heating and cooling pipe (1) for controlling the heat exchange between the casing (2) and its surroundings, wherein the casing (2) for intermediately storing heat contains a phase change material (3) which is based on normal paraffin, or a salt hydrate, and for increasing the thermal conductivity in the region of the phase change material, in its inside is either equipped with heat conducting ribs and/or graphite is added to the phase change material (3) for increasing the heat conduction capability,
characterised in that
in the inside of the casing (2), heat-conducting ribs (30) are arranged in heat-conducting contact with the casing (2), between which the heating and cooling pipes (tubes) (1) of a capillary tube mat (29) extend, whose connections (31), (32) are led through the lid of the casing for insert (plug-in) connections, and that the remaining inside of the casing of cast out (filled) with a plaster as a carrier mass in which phase change material encapsulated in plastic capsules is dispersed, as well as that a viewed ceiling element (5) is arranged on the lower side of the casing
2. A thermoactive wall and ceiling element for installation into rooms of newly built and old buildings including lightweight construction buildings, for their heating and cooling, according to claim 1,
characterised in that
as additional fire-protection precautions
 - a) the casing at least on the outside is coated with a flame-inhibiting substance in the form of a fireproofing gel or a fireproofing coating
 - b) a fire-inhibiting substance is added to the complete mass of the carrier mass and the encapsulated phase change material,
 - c) fillers with a high heat capacity acting as a heat sink are added to the complete mass of the carrier mass and the encapsulated phase change material.
3. A thermoactive wall and ceiling element for installation in rooms of newly built and old buildings, including lightweight construction buildings, for their heating and cooling, according to one of the preceding claims, characterised in that a heat-conducting lamellar design (8) with at least one heating and cooling pipe (1) integrated into it and with vertical

lamellae (9) between which sound absorption material (4) is applied and on whose lower edges a viewed ceiling element (5) as a viewed ceiling and a heat exchanger on the room side is detachably fastened, is assembled via heat-insulating side walls (22) onto the lower side of the casing (2) whilst leaving [free] a cavity (23), and that a heat-conducting heat contact body (24) is arranged in the cavity (23) and this body is connected in a heat-conducting manner to or may be brought into a heat-conducting connection with the lower side of the casing (2) and the upper side of the heat-conducting lamellar design (8), as well as that drive means (26) are present for displacing or compressing the heat-conducting heat contact body (24) in the inside of the cavity (23) in a manner such that its heat-conducting connection either with the casing (2) or with the lamellar design (8) or with both may be temporarily interrupted (separated).

4. A thermoactive wall and ceiling element for installation in rooms of newly built and old buildings, including lightweight construction buildings, for their heating and cooling, according to claim 3, characterised in that the lower side of the casing (2) forms an oblique plane which carries a heat contact layer (28), and a wedge-like, heat-conducting heat contact body (24) is horizontally displaceably arranged in the cavity (23), whose lower side is in heat-conducting connection with the upper side of the heat-conducting lamellar design (8), and whose upper side runs parallel to the oblique lower side of the casing (2), and that drive means (26) are accommodated in the cavity (23), by way of which the wedge-like heat contact body (24) is displaceable in the inside of the cavity (23) so that when required it may be brought into a heat-conducting connection with or be thermally separated from the lower side of the casing (2).
5. A thermoactive wall and ceiling element for installation in rooms of newly built and old buildings, including lightweight construction buildings for their heating and cooling, according to claim 3, characterised in that the heat-conductive heat contact body (24) in the cavity (23) consists of an elastically compressible material which in the expanded condition is in heat-conducting connection with the lower side of the casing (2) and with the upper side of the lamellar design (8) and is passed through horizontally by a movement sheet [metal] (plate) (25) which may be vertically moved by the drive means (26) so that either the upper side of the heat contact body (24) when required may be brought into a heat conducting connection with or may be thermally separated from the lower side of the casing (2), or the lower side of the heat contact body (24) when required may be brought into heat-conducting connection with or be thermally separated from the upper side of the lamellar design (8).
6. A thermoactive wall and ceiling element for installation in rooms of newly built and old

buildings, including lightweight construction buildings, for their heating and cooling, according to one of the claims 3 to 5, characterised in that the drive means (26) for displacing the heat-conducting heat contact body (24) or for compressing and expanding the heat-conducting heat contact body (24) are electrochemical actuators (ECA), electroactive polymers (EAP), thermoelectric drive elements, electric motors, motorically driven pull cables, magnetic or hydraulic force cylinders or electrorheological fluids.

7. A thermoactive wall and ceiling element for installation in rooms of newly built and old buildings, including lightweight construction buildings for their heating and cooling, according to claim 1, characterised in that the closed casing (2) consists of a section (2) which is rectangular in cross section and which on both sides is closed in a fluid-tight manner by way of a lid which is welded on, soldered on or bonded on, and in whose lower side a channel (13) is admitted, further that lamellae (9) are arranged on the casing lower side projecting perpendicularly from this, between which a sound absorption material (4) is applied, and that a viewed ceiling element (6) as a viewed ceiling is detachably fastened on the lower edges of the lamellae (9), said viewed ceiling element (5) via a support web (14) carrying a heating and cooling pipe (1) which runs in the channel (13) with a material fit.
8. A thermoactive wall and ceiling element for installation in rooms of newly built and old buildings, including lightweight construction buildings, for their heating and cooling, according to claims 1, characterised in that a sound absorption material (4) is arranged on the upper side of the casing and the support design (10) passes through this material.
9. A thermoactive wall and ceiling element for installation in rooms of newly built and old buildings, including lightweight construction buildings, for their heating and cooling, according to claims 1, characterised in that the closed casing (2) consists of a section (2) which is rectangular in cross section and which is closed on both sides in a fluid-tight manner by way of a lid which is welded, soldered or bonded on, and that at least one heating and cooling pipe (1) is integrated either the inside of this section (casing) or into the lamellae (9) which on the lower side of the casing either rigidly belong to the casing or are assembled on it in a mobile manner, and which project perpendicularly from this section (casing), and that a sound absorption material (4) is applied between the lamellae (9), and a viewed ceiling element (5) is detachably fastened on the lower edges of the lamellae (9) by way of spring clips (6).